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Maritimes Region

Canadian Science Advisory Secretariat
Science Response 2015/030

# 2015 STOCK STATUS UPDATE OF LOBSTER (*HOMARUS AMERICANUS*) IN THE BAY OF FUNDY (LOBSTER FISHING AREAS 35-38)

## Context

The status of the lobster resource in the Bay of Fundy (Lobster Fishing Areas (LFAs) 35-38) to the end of the 2011-12 seasons was assessed in February 2013 (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013) and was updated in 2014 (DFO 2014). Fisheries Management has requested "interim information on the status of LFAs 35-38 lobster stocks to maintain the scientific basis for management advice consistent with Fisheries and Oceans Canada's (DFO) Precautionary Approach (PA)". The PA defined in the 2013 assessment identified three key indicators that capture changes in lobster abundance and proposed reference points for each indicator. This Science Response updates these indicators to the end of the 2013-14 fishing season. For assessment purposes, LFAs 35-38 are evaluated collectively as one unit.

This Science Response Report results from the Science Response Process of June 3, 2015, on the Stock Status Update of American Lobster in Lobster Fishing Areas (LFA) 35-38.

## Background

### Description of the Fishery

Commercial lobster fishing in LFAs 35-38 takes place in the Bay of Fundy (Figure 1) and borders the two biggest lobster fisheries in the Northwest Atlantic: LFA 34, which has the highest landings (approximately 25,000 metric tonnes (mt); DFO 2015) and the most participants of any LFA in Canada, and Downeast Maine (Hancock and Washington Counties) with annual landings averaging 30,000 mt since 2012 (Historical Maine DMR Fisheries Landings Data). Landings in LFAs 35-38 began a long-term increase in the mid-1990s and current landings are at record highs. This increase in landings also occurred in most of the Gulf of Maine region, as well as many other LFAs in Atlantic Canada.



Canada

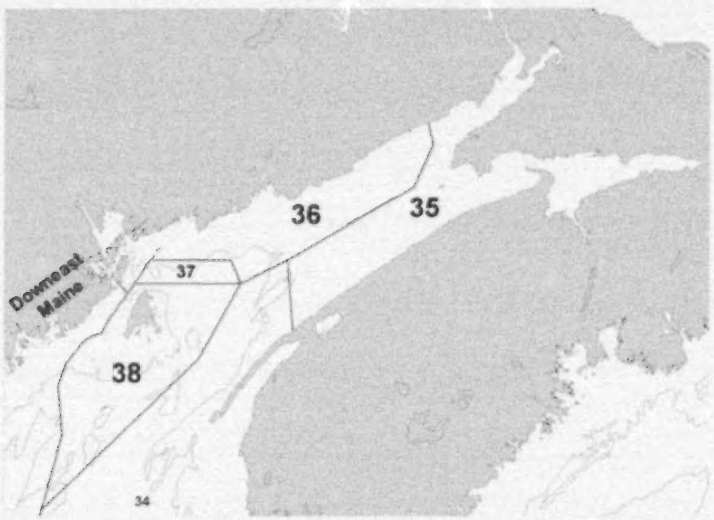


*Figure 1. Lobster Fishing Areas (LFAs) 35-38 in the Bay of Fundy. LFA 37 is a shared fishing area between LFAs 36 and 38.*

The fishery is managed by input controls including a minimum legal size (MLS; 82.5 millimetres carapace length), prohibition on landing of both egg-bearing and V-notched females, limited entry, fishing seasons and trap limits. Fishing seasons and traps limits differ among LFAs (Table 1). Other management measures include the requirement of vents to allow sublegal sized lobster to escape and biodegradable trap mechanisms to mitigate ghost fishing by lost traps.

*Table 1. Number of total licences, trap limits, and fishing seasons for each LFA within the Bay of Fundy. Note that LFA 37 is a shared fishing area where fishers from LFAs 36 and 38 are authorized by licence condition to fish.*

| LFA | Licences* | Traps Limits | Fishing Seasons |
|---|---|---|---|
| 35 | 95 | 300 | *Fall:* *Oct. 14 – Dec. 31*<br>*Spring:* *Last day Feb. – July 31* |
| 36 | 177 | 300 | *Fall:* *2nd Tuesday in Nov. – Dec. 31*<br>*Spring:* *March 31 – June 29* |
| 38 | 136 | 375 | *2nd Tuesday in Nov. – June 29* |

* as of January 28, 2013 (see Tremblay et al. 2013 for the different categories)

## Analysis and Response

The LFAs 35-38 assessment (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013) provided a full analysis of stock health by describing fishery performance and providing indicators for abundance, fishing pressure and reproduction. Spatial variation of these indicators was evaluated. With regard to the PA, three abundance indicators were regarded as primary, and associated reference points were tabled. The first abundance indicator was based on landings. Landings-based reference points are part of the current Inshore Lobster Integrated Fishery Management Plan for LFAs 27-38. The basis for these was documented at a DFO Maritimes Region Science Advisory Meeting in 2012 (DFO 2012). It was recognized that using landings as the sole indicator of abundance for lobster stocks has risks, and one of the goals of the 2013 assessment (DFO 2013) was to provide potential alternatives. Two additional abundance indicators and associated reference points were proposed. One was based on

commercial catch rate calculated as total landings per total trap hauls in LFAs 35-38 from complete records of the fishermen logbooks. The second was based on the stratified mean of number of lobsters per tow in a fishery-independent trawl survey (summer Research Vessel (RV) Survey). The abundance indicators and proposed Upper Stock References (USR) are provided below.

## Landings and Catch Rate

An upward trend in landings was recorded for the past two decades (1994-95 to 2013-14) in all three LFAs. This year landings are the highest on record, surpassing 10,000 mt for the first time (Figure 2). The proposed USR for the abundance of legal lobsters based on landings is defined as 80% of the median for the period 1984-85 to 2008-09, which corresponds to 1575 mt. The metric for assessing where the stock is relative to the proposed USR is the 3-year moving average of landings. For the fishing year 2013-14, the 3-year moving average was at 9509 mt, 6 times the proposed USR. By this measure, the lobster stock in LFAs 35-38 is in the healthy zone.

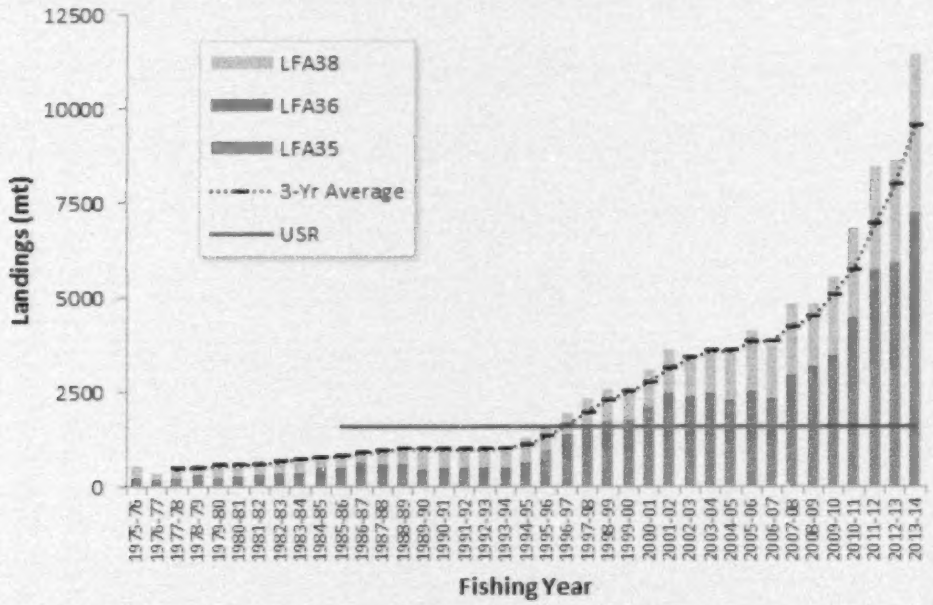


*Figure 2. Lobster landings by fishing year from the commercial fishery in LFAs 35-38 from 1975 to summer 2014. Fishing year encompasses the fall through the early summer of the following year. The red horizontal line is the proposed USR for the LFAs 35-38 (proposed at 1575 mt for the LFAs 35-38 as a whole). The black dashes with dotted line are the 3-year moving averages for LFAs 35-38 landings.*

The commercial catch-per-unit-effort (CPUE, in kilogram(kg)/trap haul) has increased substantially since 1998-99 and the 2.25 kg/trap haul for 2013-14 is the highest on record. The proposed USR for the abundance of legal size lobsters based on the CPUE (0.58 kg/trap haul) is defined as 50% of the median for the reference period 2005-06 to 2008-09. As with landings, the measure for assessing where the CPUE is relative to the proposed USR is the 3-year moving average of the commercial CPUE. The most recent 3-year moving average is 1.99 kg/trap haul, which is more than three times the proposed USR (Figure 3).

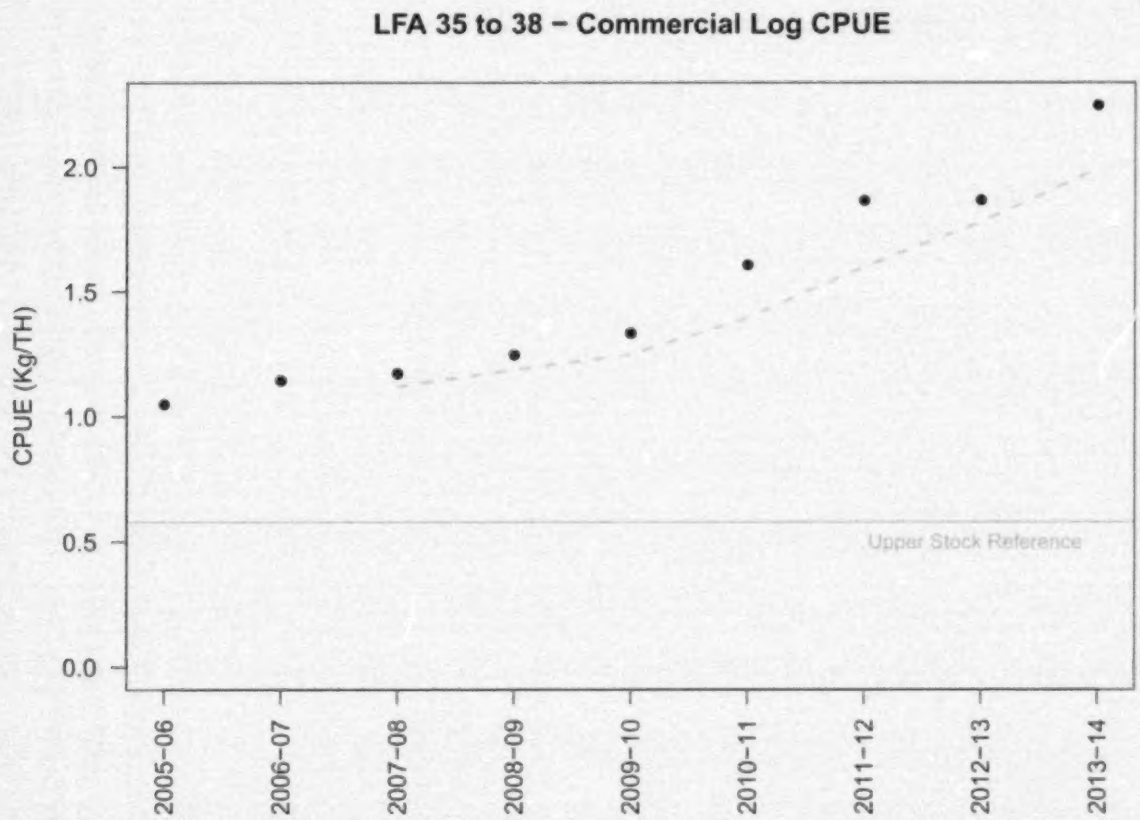


*Figure 3. Trend in commercial catch-per-unit-effort (CPUE; total weight landed/total trap hauls) per fishing year calculated from complete entries of fishermen logbooks. Proposed USR is the horizontal solid blue line (0.58 kg/trap haul). Red dashed line is the 3-year moving average.*

## Fishery-independent Survey

The fishery independent indicator proposed in the last assessment (DFO 2013) was based on lobster catch rate (number of lobsters/tow) of any size from the summer RV survey in strata 490-495 (Figure 4). The proposed USR for lobster abundance based on this survey was 80% of the median catch rate for the period 1985-2009 which correspond to 1.9 lobsters per tow. As for the previous USRs, it was proposed that the 3-year moving average be used as the metric to assess stock status. In 2013-2014, the estimated 3-year moving average was 48.3 lobsters per tow almost 25 times greater than the proposed USR (Figure 5). This survey does not sample in depths shallower than 50 metres in the Bay of Fundy, which are highly productive areas. The observed annual variability in average catch rates is likely related to low sampling intensity.

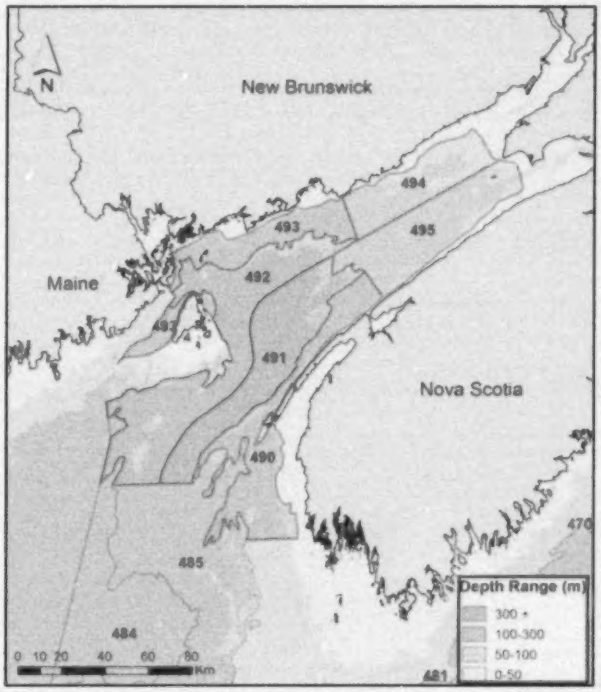


*Figure 4. Summer RV survey strata in NAFO Division 4X. Data compiled to assess lobster stock status in LFAs 35-38 are from strata 490 to 495 inclusively (n=6).*

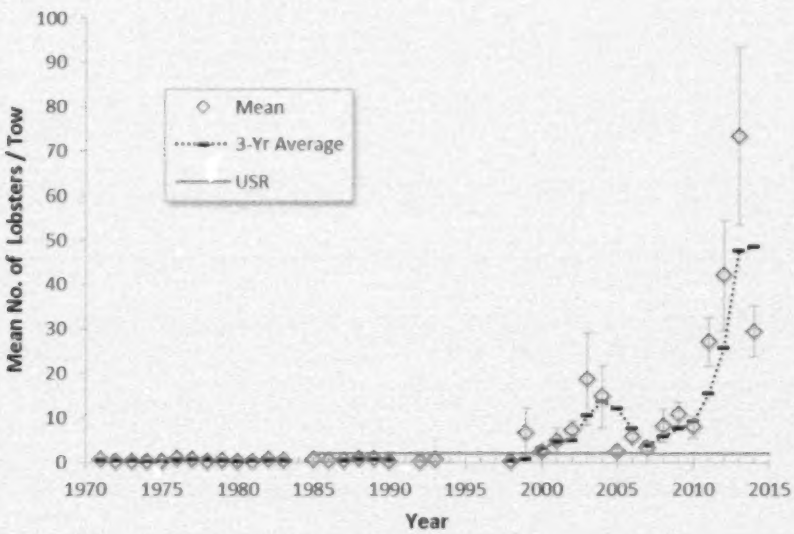


*Figure 5. Stratified mean number of lobsters per tow (including standard error) in LFAs 35-38 from the summer RV survey (strata 490-495) for all size lobsters caught (size range from 40 to 213 mm carapace length (CL)). Stratified mean is calculated by averaging the mean catch rates of the 6 strata covering the Bay of Fundy. Black dashes with dotted line are the 3-year moving averages. Red solid line is the proposed USR set at 1.9 lobsters per tow. NB: Years with no symbols (e.g. 1994-1997) had no lobster counts available; lobster total weights were normally recorded but lobster counts were not estimated from those weights in this assessment update.*

## Conclusions

The lobster stock in LFAs 35-38 at the end of the 2013-14 fishing year was in the healthy zone based on three abundance indicators (i.e. landings, commercial catch rate and summer RV survey catch rate). The 3-year running averages of these indicators were well above the proposed USRs.

Each of the abundance indicators have strengths and weaknesses that were outlined in the previous assessment (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013). Given that all three are providing similar signals, there is confidence that overall abundance remains high relative to the 1994-2009 period. However, because size-at-50%-onset-maturity in the Bay of Fundy occurred at a large size (> 90mm CL) while MLS is at 82.5 mm CL, the three primary indicators provided herein monitor a large segment of the population that are immature lobsters. Therefore, abundance trends presented here are not necessarily reflecting the broodstock trend (see Gaudette et al. 2014) and are likely influenced by recruitment regimes.

Moving forward, monitoring broodstock abundance as a primary indicator would increase the ability to assess long-term risk of recruitment overfishing. This should be developed for the next lobster assessment framework.

## Contributors


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## Sources of Information


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*MPO. 2015. Mise à jour de l'état du stock de homard de 2015 (Homarus americanus) dans la baie de Fundy (zones de pêche du homard 35 à 38). Secr. can. de consult. sci. du MPO, Rép. des Sci. 2015/030.*